



Ethical health security in the age of antimicrobial resistance

Kari Pahlman ¹, Anson Fehross,¹ Greg J Fox,² Diego S Silva ¹

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¹Sydney Health Ethics, School of Public Health, The University of Sydney, Sydney, New South Wales, Australia

²Central Clinical School, Faculty of Medicine and Health, The University of Sydney, Sydney, New South Wales, Australia

Correspondence to

Dr Diego S Silva;
diego.silva@sydney.edu.au and
Dr Diego S. Silva;
diego.silva@sydney.edu.au

ABSTRACT

Objective Owing to its potential human, social and economic costs, antimicrobial resistance (AMR) is frequently referred to as a threat to health security. Simultaneously, health security and the preservation of antimicrobials are often described as a global public good. However, how the term ‘public good’ is used in the context of health security, and the values that underpin it, remains ambiguous. Policymaking is never value-free, and a better examination of such values is critical to understanding how issues such as AMR are problematised and how policy decisions are informed.

Design We used McDougall’s version of critical interpretive synthesis to capture the recurring concepts and arguments within public policy, political science and applied ethics literature on AMR. Articles were analysed by identifying recurring ideas and developing themes across the literature.

Results A total of 77 papers were included in our review. In the context of health security and AMR, the concept of ‘public good’ appears to be used interchangeably with ‘common good’, reflecting confusion, but sometimes meaningful differences, regarding how antimicrobials, as a good, are conceived. Main approaches to addressing AMR are statism, globalism and regionalism, which appeal to different values in guiding policymakers. Common justificatory values underpinning preservation of antimicrobials as a public good were prevention of harm, solidarity, justice and rights.

Conclusion The findings suggest that within the literature there is a lack of conceptual clarity as to whether antimicrobials constitute a public good or a common good. Moreover, the way in which antimicrobials are conceived and the approaches through which AMR as a threat to health security is addressed appear to be grounded in values that are often implicit. Being explicit about the values that underpin AMR and health security is not simply an intellectual exercise but has very real policy and programmatic implications.

INTRODUCTION

With the increased frequency of epidemics and pandemics over the last 20 years (eg, Severe Acute Respiratory Syndrome (SARS) 2003, H1N1 2009, Middle East Respiratory Syndrome (MERS) 2012, Zika virus 2014, Ebola 2014, SARS-CoV-2 (COVID-19) 2019), the rate at which infectious diseases develop variants of concern has increased in lockstep.

Key questions

What is already known?

- Antimicrobial resistance (AMR) has the potential to cause severe human, social and economic devastation and is therefore often considered a threat to health security.
- Health security and the preservation of antimicrobials are often described as a ‘public good’.
- The conceptualisation of AMR as a threat to health security and the public good (including proposed solutions) is inevitably value-laden; however, these values are not well understood.
- The values that underpin how policy problems are conceptualised have very real policy and programmatic consequences.

What are the new findings?

- The concept of ‘public good’, in the context of health security and antimicrobial effectiveness (AME), often appears to be used interchangeably with ‘common good’.
- The main approaches to securing AME are statism, globalism and regionalism, each appealing to different values that guide policymaking.
- Common justificatory values that underpin understandings of AME as a public good relate to protection from harm, solidarity, justice and rights.

What do the new findings imply?

- The lack of conceptual clarity between antimicrobials as a public good or a common good is not immaterial but rather reflects important differences in how the problem of AMR is conceptualised and the approaches by which we can address it.
- The values that guide our thinking about AMR and health security also have implications for how AMR can be addressed, for example, depending on how we balance the value of the safety of one’s populace against the value of global justice.
- Being more explicit about the positions we adopt is critical for a more nuanced debate on these issues.

While contending with the normal challenges in developing novel antimicrobial treatments for novel infections, the scientific community and policymakers must simultaneously consider future mutations that would pose threats to humans and other animals. The strain on the antimicrobials developed

and used to protect human safety and well-being from epidemics and pandemics (including antibiotics, antivirals, antifungals and antiprotozoals) is coupled with growing antimicrobial resistance (AMR) of other serious, globally endemic infectious diseases, for example, tuberculosis and malaria. This is the backdrop against which governments must try to protect their residents from infectious diseases in an interconnected world.

From routine surgeries and modern cancer therapies, day-to-day medicine and public health are dependent on antimicrobial agents. Antimicrobials are also essential for animal health, agriculture and food security more broadly. However, since they were first developed over 90 years ago, microbes have evolved and developed resistance to these drugs. The causes of such resistance are multifold: clinical overuse and misuse of antimicrobials, decreasing number of new candidate agents in development, and the natural evolution of microbes all contribute to AMR.¹ There is thus an increasing global incidence of infectious diseases caused by pathogens resistant to, and therefore untreatable with, any known antimicrobial agents.²

As noted by the World Health Organization (WHO), however, failing to contain AMR is ‘a global health security threat’³ since ‘precious public goods in the form of antimicrobials are being jeopardized, leading to detrimental effects on human and animal health, the environment and ultimately in achieving the SDGs [Sustainable Development Goals]’.⁴ AMR is a health security threat not just because of the associated human morbidity and mortality (globally drug-resistant diseases cause at least 700 000 deaths each year and could increase to 10 million per year by 2050 under a worst-case scenario developed by the World Bank if no action is taken),^{5 6} but also because of the potential to cause broader social and economic disruptions, including on productivity and trade, as well as higher healthcare costs and increase in extreme poverty, among other impacts.^{6–8} Owing to the potential obsolescence of antimicrobials, they are often conceived of within literature related to health security as a non-renewable resource and AMR is thus described as a threat to the future availability and use of such antimicrobials.^{9–15} In turn, antimicrobials and the containment of resistance have been described as a ‘public good’ necessary for promoting health security.^{4 6 16}

Critically, how the term ‘public good’ is used in this context remains ambiguous, not least due to the ambiguity of other related terms in this field, including the term ‘health security’ itself. Moreover, the conceptualisation of AMR as a threat to health security as well as the proposed solutions are inevitably value-laden, that is, questions about responsibility, stewardship and who must forgo the use of antimicrobials for the greater good are all ethical questions that turn on the values of the organisations and scholars writing on the topic.¹⁷ However, what values are actually being espoused in the context of health security and the preservation of antimicrobials as a public good are not well understood. The values that underpin how policy problems are conceptualised have

very real policy and programmatic consequences; articulating such values is critical to understanding how policy decisions are formulated and prioritised and the goals they seek to achieve.^{18–20} Thus, the aim of this paper is to answer the following questions: how is health security, in the context of AMR, understood as a public good in academic and grey literature? And second, what values ground the debates about AMR and health security?

METHODS

This paper is a critical interpretive literature review based on Dixon-Woods *et al*'s²¹ critical interpretive synthesis methodology, adapted for bioethics by McDougall.²² The purpose of this critical interpretive review is to capture the key ideas from the available academic and grey literature on health security, AMR and public goods. As explained by McDougall,²² ‘in a critical interpretive review, the literature search is thoughtfully-designed and thorough, but not systematic in the sense of aiming to assemble *every* article relevant to the research question’. It aims not to simply aggregate and review findings or arguments, as is often the goal of systematic reviews, but rather to capture or ‘take stock’ of the key ideas, and offer reflections about the literature as a whole so as to inform further debate.^{22–24} This method of review is also noted to be more appropriate than traditional systematic reviews for questions within the field of bioethics, especially where terms may be used vaguely or inconsistently, and where relevant literature may span various disciplines and methods, as it does in this case.^{22 25}

The initial search strategy involved searching key social sciences databases, as well as the top 20 ranked bioethics journals according to the Google H5 index in April 2020. Search engines and databases searched were Google and Google Scholar, Web of Science, Scopus, JSTOR digital library, ProQuest, PhilPapers, Analysis and Policy Observatory (APO) and OpenGrey, chosen to capture a broad variety of literature across social sciences, philosophy and public policy. Databases were searched using a combination of terms. Search strings were variations of (“health security” or “health governance”) AND (“public good” or “common good” or “public interest” or “common interest”) OR (“antimicrobial resistance” or “AMR”), adjusted for different databases. The search initially resulted in a total of 576 texts, 508 of which were unique results. After title and abstract reads by KP, 167 titles remained. Papers excluded during the title and abstract reads were those that were clearly irrelevant to the research question at hand. Papers that met the search criteria but excluded due to lack of relevance included those focused solely on issues of global health governance, or One Health, for example. KP then read the full texts according to the inclusion criteria agreed with AF and DS. The main criterion was that the papers discussed the concepts of AMR, health security or public good in a substantial way and in relation to one another (i.e., they discussed at least two of the three concepts not entirely

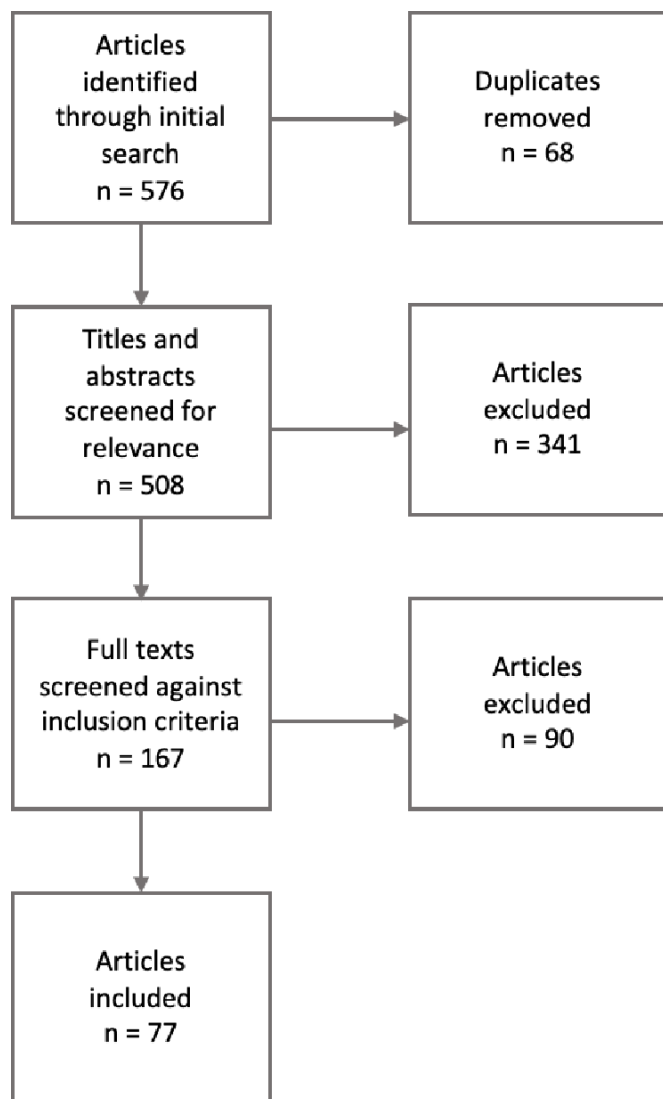


Figure 1 Summary of literature search process.

out of context of one another, and not only in a cursory or superficial manner). Papers would also either be peer-reviewed academic literature or grey literature, including policy and legislative documents. No date restriction was applied. A total of 77 articles were left. The reference lists of included papers were consulted; however, this resulted in no additional results. The process is outlined in [figure 1](#).

Following the final selection of articles, KP conducted a process of coding, whereby key themes and concepts were extracted from the literature as they emerged and were grouped accordingly. This included value statements that were then grouped under key terms that were, at times, used explicitly, but broadly chosen to best reflect such statements as they appeared across the literature as a whole. These ‘codes’ formed the basis of what we assert to be the most prominent findings within the body of literature reviewed. The narrative and logic of the results were then discussed together with DS and AF, and following the drafting of the results were validated

by DS with a secondary reading of included papers. The results were reviewed the second time by GF.

Patient and public involvement

Patients or the public were not involved in the design, conduct, reporting or dissemination plans of this research.

RESULTS

The included articles came from a broad range of fields, largely global health, health policy, health systems, bioethics, health security and international relations, predominately originating from high-income countries (HICs). Approximately two-thirds were academic articles with one-third grey literature, collectively spanning the years 2003–2020. We identified three broad categories of themes in the literature, namely discussion of antimicrobial effectiveness (AME) as critical to health security; the values that justify the proposed measures preserving antimicrobials; and the value-laden approaches to preserving AME. We present each in turn. Online supplemental appendix 1 provides example quotes of the various themes outlined in the following sections.

AME as health security (the ‘what’)

A recurring theme within the literature is that AMR—caused by overly permissive use of antimicrobials and lack of effective regulation, surveillance and infection control measures—is a significant threat to health security.^{3 26–40}

While several authors did not articulate why AMR was a threat, many did. The types of threats identified include the economic cost of AMR (i.e., cost to public health systems and lost productivity), human cost (i.e., morbidity and mortality), cost to animal health and welfare, cost to agricultural productivity and food security, cost to medical advancements, and the inevitable development of new and untreatable infections.^{10 26 28 30 33 34 36 37 39–45}

Widespread AMR has been described as one of the hallmarks of the third epidemiological transition, where society moves back to a preantibiotic (or rather, postantibiotic) era, unable to perform an array of life-saving medical procedures and facing an increasingly uncontrollable burden of infectious disease.⁴³

Following from this, much of the literature describes the prevention of such infectious diseases (and resistant pathogens) and the preservation of AME as a global ‘public good’.^{26 36 40 41 46 47} Based on macroeconomic ideas, public goods are defined as those which are non-excludable and non-rivalrous. This means that no one can be excluded from their benefit (as opposed to private or club goods), nor does the quantity of benefit reduce if shared with more people.⁴⁸ The rationale is that preserving AME and preventing emerging infectious diseases, which are transboundary in nature, would bring non-excludable and non-rivalrous benefits to all people.^{36 49} The difficulty, as noted by several articles, is that because AME is a global public good, the international cooperation required to curb AMR has elements

of the classic ‘collective action’ and ‘free rider’ problems, whereby countries fail to cooperate due to the externalities associated with addressing AMR.^{32 42 46} The collective action problem holds that addressing AMR is beyond the scope of any individual country and requires a global effort from which all countries would benefit over the long term.⁴² However, facing their own short-term interests and constraints, countries are thus disincentivised to shoulder the responsibilities and costs, especially without guarantee that their efforts would not be undermined due to inaction in other parts of the world.^{32 42} Moreover, as any benefits of investments to preserve AME are diffuse across the world and countries can benefit from others’ contributions, there is an incentive to ‘free-ride’ on the prudence of others.^{42 46} It is also noted that the collective action problem is compounded in the context of AMR due to the array of stakeholders and sectors with an interest in antimicrobials—not only human health, but also animal health, food and agriculture, trade and migration.⁴²

Notably, however, there appear to be inconsistencies in the literature regarding whether AME is indeed a public good. For some authors, AME is instead characterised as a ‘common good’ or ‘common pool resource’.^{9 10 50} Common goods are defined as goods that are non-exclusive but rivalrous.^{9 48 51} This is because the conditions that have enabled AMR to worsen—that is, global market failures and lack of incentives to develop new drugs and implement stewardship arrangements to govern their appropriate use (the ‘misalignment of public and private interests’)³²—have led effective antimicrobials to be seen as a finite resource and therefore rivalrous in consumption.^{41 51} Without appropriate regulatory mechanisms to preserve the effectiveness of antimicrobials, consumption of such agents now erodes the effectiveness of agents used in the future.^{10 43} That is, ‘each time an antibiotic is ingested, the likelihood increases that the antibiotic will be less effective in the future not only for the person who took the antibiotic, but for others as well’.⁴³ AME is therefore frequently described as the ‘tragedy of the (antibiotic) commons’.^{10 43} The literature has drawn parallels between AME and environmental resources as common goods, such as clean air and water, which are also subject to depletion in the absence of strong regulation.⁴⁶ While some papers are explicit about the difference in public and common goods,^{9 10 48 50 51} the literature more broadly tends to use these terms interchangeably and often without clarification. One paper, for example, describes antibiotic effectiveness as ‘a common pool resource *or* public good’⁴⁷ (emphasis added), while another states that ‘to avoid an AMR ‘tragedy of the commons’ situation, antimicrobial effectiveness needs to be recognized as a fundamentally important global public good’.⁴¹ Other papers describe AME (or antimicrobials themselves) as either a public good^{4 32 33 41 46 52} or a common good (or a common pool resource),^{9 10 50} sometimes without necessarily explaining the features that define it as such (see online supplemental appendix one, table of quotes).

Approaches to securing AME (the ‘how’)

Having identified AME as a public or a common good, authors then proposed approaches to securing AME, while describing who is responsible for doing so. Responsibility is a foundational idea of ethics and speaks directly to the concept of legitimacy (i.e., who should act and how they should act). The literature includes instances of three distinct approaches: statism, globalism and regionalism.

Statism

For statists, the security and sovereignty of the nation-state—the primary, if not the only, actor relevant to global health governance—are the primary moral concern.^{53 54} Health security is understood to be an extension or pillar of national security.^{45 55} The statist approach relies heavily on a protectionist stance, where the protection of the state and its citizens is the primary objective.^{37 56 57} This is demonstrated through the securitisation against infectious diseases and drug-resistant pathogens, a process which leads such public health issues, once previously in the realm of ‘low politics’, to be seen as existential threats which may demand exceptional measures.⁵⁵ The securitisation of infectious diseases has been spurred by the increasing awareness and recognition, particularly by Western states, of the impact of infectious diseases and drug-resistant pathogens on national security. Indeed, in practice, global health security from a statist perspective tends to reflect the concerns of states in the global north vis-à-vis the international spread of diseases originating from the global south—the prevailing perspective being that of ‘my country first’.^{37 56 57} Critically, according to some of the literature, the way threats are securitised is driven by political, strategic and economic interests rather than any objective assessment of where the most critical health needs are globally. The ‘apparent disparity between global health needs and global health security priorities’ is evident, and securing global health from this approach has been largely about developing and maintaining capacities to deal with only particular kinds of risks.⁵⁸ It is noted in the literature that while ‘a security-oriented approach to disease risks might succeed in improving the protection of human health... [it is] only to the extent that a direct and immediate connection to national interest could plausibly be drawn’.⁵⁸ Put another way, appealing to the national interests of countries in the global north is unlikely to result in significant commitments to international disease control where such diseases pose little direct threat.⁵⁵ The securitisation premise ultimately ‘relieves Westerners of any moral obligation to respond to health crises beyond their own national borders’.⁵⁹

According to the literature reviewed, the statist approach to AME is adopted predominately by Western states, largely focused on the protection of the West from threats emanating in the ‘developing world’, that is, low-income and middle-income countries (LMICs).^{53–58} One paper argues that this approach is grounded in a

Westphalian tradition of international politics and public health, the objective of which when it comes to addressing the problem of ‘cross-border microbial traffic’ is narrowly tailored to the national interests of powerful states that fear ‘importation of pathogens from [the] poor’.⁵³ Actions to address AMR are largely taken only when countries feel threatened themselves; references to collective action for AME are made predominately in terms of supporting LMICs as hotspots or reservoirs of AMR (i.e., the source of risk) to bolster their health security capacities to contain disease and thereby protect HICs (i.e., those at risk).^{33 43 60 61} In terms of policy interventions, the statist frame emphasises the need for improving global surveillance of AMR and for developing capacities to respond to AMR outbreaks before they spread across and between countries. It is worth noting also that while statism is absolutely not reserved for the West, securing AME is noted in the literature to be less of a priority in LMICs, where there may be simultaneous pressing ‘securitisations’.¹¹ That is, where there are competing health threats or priorities, including accessing affordable antimicrobial agents in the first instance, the securitised statist approach is usually less well observed.¹¹

Globalism

The second approach referred to in the literature, globalism, finds that achieving health security is not necessarily all about self-interest, but can denote a more ‘solidaristic public sphere’.^{11 62} For globalists, the primary referent for thinking about security and the provision of public goods is the human being rather than the nation-state, or even the state-citizen. The focus on public goods from a globalist perspective demonstrates a shift from protecting one’s state to protecting individuals everywhere.⁵⁵ Such an approach is seen particularly in the grey literature of multilateral development agencies, which seek to establish collective responsibility for health and recognise that health threats are defined not by state boundaries, but by what threatens individuals and communities, including poverty, social determinants of health, etc.⁵⁵ Such agencies and organisations are becoming more and more explicit about their engagements to secure global public goods such as AME, and spending money for the collective or common good at the global level, including funding for projects that will have an impact beyond the borders of that country.⁶³ This approach rests, at least somewhat, on the understanding of the negative externalities of AMR as a transboundary issue, and that the misuse of antimicrobials (and the erosion of AME) compounds that problem for all people irrespective of state boundaries and thus must be treated as a global challenge.^{9 42} The promotion and preservation of AME are thus a shared and collective responsibility that requires strong commitments from policymakers globally; it is a global public good for global citizens.^{9 33 42} This global public goods approach envisages policy responses that extend beyond the state and its narrow interests, and that public goods are provided on

the grounds of solidarity and global justice to benefit not only those in HICs but also LMICs.⁵³

A key aspect to the globalist approach to providing global public goods is the understanding that this is the responsibility of, and requires effective coordination between, not only states, but non-state actors as well. Global health security recognises the interdependencies between countries during emergencies and that no single stakeholder can unilaterally or singlehandedly address all the health threats it faces.⁴⁵ This approach draws on theories of global governance and global health diplomacy insofar as achieving health security relies on multilevel and multiactor engagement, trust and collaboration, including with non-governmental and intergovernmental organisations and levers, for example, WHO and SDGs, respectively.^{45 51} One paper makes the case that the WHO, in fact, should be positioned as a norm-setting organisation and guarantor of health security and focus on addressing the underprovision of global public goods for health.⁶⁴ The engagement of multinational corporations and the private sector is also emphasised in this approach, particularly in terms of the importance of public–private partnerships for global public goods such as AME, particularly for financing and product development, to ensure sustainability of public goods and overcome both market failures and free rider problems.^{26 28 37 41 49 65–67}

Regionalism

Regionalist approaches appear to take a middle ground when addressing the problem of AMR and providing for ‘global’ public goods. It is grounded in the recognition that while the problem of AMR is certainly global in scale and requires strong global governance mechanisms, the prevailing system is still based on individual states, which can be a challenge for addressing such a collective action problem. Moreover, different regions and countries have different needs.^{38 68} A regional approach to health security, governance and the provision of public goods, at least in part, appears to be a matter of scope and a reflection of shared externalities among states that arise from a common geographical area.⁶¹ This includes both disease threats as well as the positive benefits that come from a country’s health security investments that often extend beyond their borders.^{38 61 69} This is evident through new and proposed regional governance mechanisms, such as the Association of Southeast Asian Nations (ASEAN) and the ASEAN Plus Three, as a means for mobilising financial and technological resources to enhance regional preparedness and response capabilities, including with respect to addressing AME, and potentially other public goods such as biosample sharing and stockpiling of vaccines.^{61 70–73} Regional development banks are another example of this approach to health security and public goods; for example, the Asian Development Bank’s Regional Cooperation and Integration Strategy recognises the importance of investing in collective action to reduce regional health threats in Asia and the Pacific.²⁷

Its Operational Plan for Health 2015–2020 laid out the bank's mandate to increase investments in the health sector to 3%–5% of its total portfolio and expand support to regional public goods in health (i.e., regional health security as a flagship programme).²⁷

Justificatory values to preserving AME (the 'why')

Underpinning the understanding of AME as a public good in the context of health security, alongside responsibility for its provision, are a number of key justificatory values. These are protection from harm, solidarity, justice and upholding rights. These terms, although used explicitly by some papers, have been chosen by us to capture and group the values identified in the literature. These values are significant because they ground, and justify, public and private responses to AMR, and as we attend to later in the discussion have very real implications for health security policymaking.

Protection from harm

The first key value which underpins AME as a public good in the literature is protection from harm, and in particular harm as susceptibility to disease threats. This is somewhat implicit, framed predominately in terms of safety and security, and the need for protection from external threats, that is, drug-resistant pathogens. AMR is described in the literature to be a 'formidable threat to human and animal health'⁴¹ and the safety of persons and communities.^{10 34 43 45} For some, protection from harm from a health security perspective seems to be focused specifically on a country's own citizens in a way that potentially appeals to more statist approaches.^{29 45} One paper acknowledges, for example, that 'non-traditional' biological threats such as antibiotic-resistant bacteria are becoming a major target of the biodefence community in the USA so as to 'protect U.S. Armed Forces and citizens at home and abroad'.²⁹ Broadly, however, this underlying value of protection points to the tangible risk of harm to human health and that comes from the potential for AMR to reduce the ability to treat previously treatable infections and to complicate surgical procedures and other treatments for immunosuppressed individuals, including where antimicrobials are used prophylactically.⁵⁷ There is also the risk that AMR drives the further spread of disease and the development of new strains of resistant pathogens that are more difficult and costly to manage. As one paper highlights, 'with globalization also emerge the so-called artificial disease force-multipliers... [which] include modern medical practices such as the overuse and misuse of antibiotics'.⁷¹ Ultimately, depleting stocks of effective antimicrobials causes harm and is a danger to health security, as well as to a country or region's social, economic and food security. The preservation of AME as a public good is thus seen in terms of containing the risk of harm that would come from not being able to defend against infectious diseases and protecting individuals and countries against the potentially escalating threat and impact of AMR.^{57 71}

Solidarity

Another value that underpins AME as a public good within the literature reviewed is that of solidarity: the sense of a 'common global security'.³⁷ Solidarity is not only discussed in terms of equal access to essential medicines such as antimicrobial agents (we discuss this in the following section with respect to distributive justice), but also in terms of action to address AMR as a global problem. In appeals to solidarity, the focus shifts from being about the protection of any given individual or state to the protection of the broader global community. Described in the literature as 'the most important value in global health',⁷⁴ solidarity in this context is about preserving the effectiveness of antimicrobials for not just a few people in certain countries, but for everyone.^{51 53} Solidaristic action to preserve AME recognises that not only is it 'the right thing to do', but also there are shared interests and vulnerabilities between all people in the face of AMR, as 'health security in high-income states becomes imperilled when poorer countries lack basic health infrastructures', including to fight pathogenic threats.⁷⁴ The value of solidarity emphasises that AMR can only be dealt with through true collective action, shared responsibility and respect for global norms.⁷⁴

Justice

Authors also used justice to articulate and justify AME as a public good. This is manifested in terms of both global and intergenerational justice. First, global justice is seen through the lens of development insofar as AMR, and threats to health security more broadly, can be conceived as more than simply a health problem, but one that has broad implications for human, social, environmental and economic development.^{33 41 57 65 75} This is particularly evident in the literature from multilateral organisations such as the WHO, the Global Fund, the Asian Development Bank, and the United Nations Interagency Coordination Group on Antimicrobial Resistance, as AMR is cited as having the potential to set back health and development gains.^{3 4 27 39 76} The WHO, for example, notes that AMR 'has the potential to impede the achievement of the Sustainable Development Goals',³ including those related to reducing poverty and hunger, access to clean water and sanitation, and economic growth, among others.⁴¹

Justice is also invoked to highlight issues related to differences and inequalities in access to, and use of, antibiotics in populations globally. Authors often note that LMICs have the greatest infectious disease burden, including those easily treated by antimicrobials, and yet these countries, at least historically, have used much less antimicrobials per capita than HICs.⁷⁵ As one paper notes, some LMICs have so far not enjoyed their fair share of the benefits of antibiotics and thus it may be unjust or unfair to require these countries to reduce antibiotic consumption to the same extent as other countries.⁵⁰ That said, this is of course not generalisable to all LMICs, and some are now significantly increasing

consumption of antimicrobials. Even so, the problem of AMR from a global justice standpoint is positioned as needing to preserve AME as a public good globally, while still ensuring equitable and affordable access to antimicrobials for LMICs.³³

Further to this, the literature notes that LMICs may also be more susceptible to the burden of AMR due to structural factors such as lack of access to second-line therapies, as well as weakened health and regulatory systems, among other issues.^{3 55 57 75} There is also inequality in how resources are depleted due to poverty, poor infrastructure or weak health systems in some parts of the world. Healthcare settings with limited diagnostic, human resource and infection control capacities, for example, are more likely to give rise to AMR due to an inability to detect resistant pathogens or inappropriate prescribing as a guarantor against incorrect diagnoses, among other factors.⁴ The need for antimicrobials to counter lack of clean water or sewage systems is another example.⁴⁰ Unfairness is also raised as an issue in terms of HICs outsourcing antibiotic manufacturing to countries with more limited regulation on industrial effluents, thereby externalising pharmaceutical waste to LMICs.⁷⁵ Environmental contamination with antimicrobials means people in these countries are thus at risk of acquiring resistant microbes even without exposure to direct treatment with antimicrobials.⁷⁵ That said, poverty and inequality (in the context of AMR) are certainly not restricted to LMICs, nor is environmental pollution with antibiotic-resistant bacteria, which remains a significant issue in HICs also, especially food-producing countries.⁷⁵ It is important to note that, while AMR is, as per the literature, broadly understood as a threat to health security, the upstream conditions and arrangements (social, political, economic) that allow AMR to develop and allow for inequalities in the distribution of antibiotic benefits and burdens are generally not.⁵⁵

The literature also raises the issue of AMR, or the inappropriate use of antibiotics and the depletion of AME, as an issue not only of global justice, but also intergenerational justice.⁷⁵ In other words, considerations of justice flow not only across national and international boundaries to those in other parts of the world, but also across generations to future populations. It is noted that ‘current arrangements (social, political, economic) allow inequalities in the distribution of antibiotic benefits and burdens.... [and] [t]he short-term pressing needs of some are being traded against the needs of those yet to be born’.⁷⁵ The concern is that as available antimicrobials continue to be depleted and misused, they will ultimately be rendered ineffective for future generations.⁴⁵

Rights

Finally, although rights are not values per se, they are regarded as valuable in the literature, particularly the right to access effective and affordable antimicrobials grounded in the legally enshrined right to health. The literature also points to a recognised tension in public

health between such individual *private* rights and the collective right to *public* goods.⁷⁷ There is a discussion in some papers about the legitimacy of restricting the rights and short-term interests of individuals for the benefit of the broader collective interest, in this case rationing antimicrobials, at least where conditions may be self-limiting or be reasonably treated without antimicrobials.^{10 50}

At the same time, there is a discussion in the literature about whether ‘rights-talk’ may be problematic in the context of global health, namely due to its individualist (and state-centric) assumptions and preferences that make it more difficult to prioritise and address shared global public goods.^{78 79} In the context of AMR, the preservation of AME would be very difficult if approached solely from an appeal to individual rights. This logic is that individual preferences and short-term interests in consuming antimicrobials would be prioritised over shared goals such as the long-term preservation of antimicrobials. It is further argued that the central theme of global health justice, broadly, is collective and that ‘the communal frame emphasises that individuals are often best protected and served by granting communal rights and providing communal and public goods rather than focusing on what is due to individuals’.⁷⁹ This approach suggests that the right to health (and indeed to public goods which require collective action such as AME) ought to be conceived primarily as a collective right, rather than an individual right. It is also pointed out that ‘rights-talk’ is also less effective when it comes to complex or upstream goods, for example, in that it is easier to provide single and simple goods, for example, providing a bed net rather than a malaria-free environment or achieving sustained AME.⁷⁹

DISCUSSION

Based on our critical interpretive synthesis, we can draw two conclusions. First, the findings suggest that within the literature there appears to be a lack of conceptual clarity as to whether AME (as health security) is a public good or a common good. Second, conceptualising AME either as a public or a common good, and subsequent descriptions as how to best preserve antimicrobials for the sake of ensuring the security of a population, appears to be grounded in values that are often—although not always—implicit. When the values espoused are explicit, they are often deployed with little analysis as to how they influence the way we conceptualise and respond to the problem of AMR, or what they mean for health security more broadly. For example, some papers reference the importance of global solidarity for health security and infectious disease control, but do so, however, in a cursory manner without detailed explanation as to the principles entailed.^{51 62 74} Trying to articulate clearly what values are used—and how they are used—in arguments of AME and health security as either a public good or a common good is not merely an intellectual exercise but has critical implications for public policy and how

successfully countries can address the problem of AMR and promote AME. In the remainder of this section, we will examine both conclusions in turn.

Apart from a few select articles,^{9 46 48} the concept of public good appears to be used without a great deal of distinction from, and even interchangeably with, that of the common good or ‘common pool resources’. This conflation was expected to some extent given the ambiguity of terms at play and hence the reason for including ‘common good’ within our search terms. Public goods, as explained in the results, are those which are non-exclusive and non-rivalrous. A frequently cited example of public goods is streetlights; it is not possible to exclude anyone from the benefit of the light produced, and one person’s use of the light does not lessen or diminish the benefit available to another person. Common goods, on the other hand, are those which are non-exclusive but rivalrous.^{9 48} They are often described as common pool resources because they are understood as resources that are shared and, importantly, finite.⁹ Environmental resources, such as fish, are a typical example of common goods. It is argued that just as one person going fishing reduces the number of fish in the sea for others, one person’s use of effective antimicrobials may reduce the number of effective doses of antimicrobials for others, including future generations and even that same person in the future. The tension between a person’s short-term interest in consuming antimicrobials and their long-term interests in preserving the effectiveness of antimicrobials for the future lies at the crux of the challenges associated with AME, as described in the Results section.

The difference between common goods and public goods, therefore, is the role of rivalry, reflecting important differences as to how one conceptualises the problem. Antimicrobial use is not inherently rivalrous; the notion of rivalry is normative and not a property of a good in and of itself. Rather, it is the broader social and economic systems that imbue goods with a dimension of rivalry. Antimicrobials are necessarily rivalrous under a free-market-based conceptualisation which, in many settings, recognises them as tradable commodities rather than public goods.⁸⁰ In these settings, commercial entities that manufacture and sell antimicrobials and have claim to their profits are often incentivised to encourage uptake and overprescribe antibiotics, often without consequence.⁸⁰ Moreover, acknowledging the role of markets in making the use of antimicrobials rivalrous is critical in decoupling the idea of ‘rivalry’ from ‘depletion’: the depletion or consumption of a good, whether of stocks of antimicrobials or fish, does not automatically and inevitably mean that such depletion must be addressed via measures that create rivalry. Stated differently, addressing depletion through rivalry is a *choice*.

To explain, deregulation and widespread availability of antimicrobials under a free-market paradigm have resulted in a community perception that antimicrobials should be available on demand, to meet individual need, without a sense of the collective good. However, this

conceptualisation neglects its potential to be used as a public good that is sacrificed when antimicrobials are used inappropriately. Overuse of antimicrobials results in poorly targeted therapies being given, contributing to acquired drug resistance and the reduced potency of these drugs to fight common infections. The market for antimicrobials arguably cannot be considered in the same way as for other pharmaceuticals, such as medications for heart diseases, which are not susceptible to overconsumption. Even if the market develops new antimicrobials, they will again likely fail due to the same drivers of AMR at present.⁷ Widespread and stringent regulation or stewardship of new drugs within the current market system might, in turn, have the counterintuitive effect of reducing future research and development by inadvertently creating financial disincentives. This has resulted in limited investment in new antimicrobials over the past decade that further exacerbates the problems of AMR.⁸¹ Thus the ‘tragedy of the commons’ will not easily be addressed by using existing market mechanisms and incentives.⁸⁰

To conserve new antimicrobials, their use must be constrained and reimaged, necessarily realigning incentive structures and reducing the potential market for these drugs. We will not only need new approaches to financing the development of antimicrobials, but also a different mindset about the type of goods that we imagine antimicrobials to be. We must recognise ‘[AME] as a fundamentally important global public good and govern... accordingly’⁴¹ so as to conserve the use of antimicrobials for the benefit of the community in the long term. That antimicrobials are such an essential resource and therefore, arguably, should be commonly owned by humanity (rather than patent holders) and thought of as ‘humanity’s common heritage’ has been discussed elsewhere.⁸⁰ A common commitment to investment in antimicrobials, as well as the regulation of their use in a way that reimagines them from being consumptive commodities to public goods, will be critical to the long-term control of drug-resistant infections globally and thus to health security into the future.

If there is a *global* collective response to AME in which antimicrobials are developed and stewarded more innovatively, outside the strict confines of markets (and away from state-centric regimes of infectious disease control, which are arguably incompatible with the pursuit of *global* public goods), we can imagine a scenario in which their effectiveness is better preserved and the benefits sustained as a public good for all people, including into the future, or at the very least a scenario where the pace of resistance does not outpace the development of new drugs, for example. What such a scenario might look like, the mechanisms that would be required to slow AMR and the ethical justifications required for such are the topic of a broader literature across ethics, health sciences and economics alike.^{82–85} Nevertheless, curbing AMR in the long term will ultimately require a fundamental paradigm shift in public health policy, one that recognises

the shortfalls of current (market-based) solutions in addressing problems as wicked as this.⁷ As Klein and colleagues⁸⁶ argue, ‘stewardship can improve judicious use without diminishing access to effective medications’.

The need to reimagine AME as a pure public good outside the confines of markets is an example of a broader issue related to our second conclusion: the need to be explicit about the values that do, and ought to, guide our thinking about AME and health security. Being clear about what values guide decision-making in this space and why will feed back and likely improve decision-making itself. For example, a reasonable debate exists among cosmopolitan political theorists (i.e., a disparate group of scholars that agree that states have obligations to persons beyond their own residents) about what kinds and degree of material preferences states can offer their own citizens and residents prior to those outside their borders.^{87 88} Arguments can be marshalled either towards the need to first and foremost protect the safety of one’s populace, or acceptance of some costs and risk towards one’s populace for the sake of global justice. In the context of AMR, perhaps a globalist approach based on a sense of global justice would mean adopting AME stewardship measures knowing other countries that have not contributed will still benefit from one’s actions.

Our point here is not that one argument or set of arguments is clearly stronger than the other; rather, our point is that the value, or set of values, one chooses to adopt will have very real policy and programmatic health security ramifications with regard to AMR and AME. Public policymaking, although traditionally thought of as rational, technical and value-neutral, ‘is an inescapably moral enterprise’⁸⁹ in which evidence cannot serve as the sole basis of decision-making.⁹⁰ Every health system and political system embodies values that influence understandings of policy problems and the prioritisation of issues, guide the development of policy options, underlie the means of achieving such policy goals and help determine the acceptability of such policies.^{18 19 91}

It is becoming increasingly accepted that policymaking is a dynamic process, necessarily embedded within social and political contexts shaped by human agency, and that decision-making requires a constant trading off between competing values.^{20 89} For example, there is a discussion within international relations literature that the state-centric, militaristic view held within security studies is a normative choice, and not the only possible or valid option when it comes to health security.⁹² Some scholars argue health security can adopt a ‘positive’ lens that instead enables more human-centric values.⁹² In the context of AMR, as alluded to above, the way in which we approach AMR as a threat to health security may also look different depending on the values we lean on, whether global justice or solidarity, or a more protectionist posture, for example.

Values ultimately have a significant impact on policy decisions and the allocation of resources, and at the same time policy agendas work to legitimise and promote

certain values over others.¹⁸ Being clear about and examining these norms and values—and demanding moral deliberation and a public articulation of said deliberations from decision-makers—is an important part of policy analysis and could likely lead to more transparent policy decisions. Transparency alone does not guarantee that the decisions will be defensible, but at least doing so could allow for more nuanced and stronger debate that would eventually lead to better health policy to secure AME.

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ORCID iDs

Kari Pahlman <http://orcid.org/0000-0003-1259-5120>

Diego S Silva <http://orcid.org/0000-0002-8195-6404>

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